Lower Duwamish Waterway Group

Port of Seattle / City of Seattle / King County / The Boeing Company

Appendix D
Area of Potential Concern Analysis

Final Feasibility Study

Lower Duwamish Waterway
Seattle, Washington

FOR SUBMITTAL TO:

The U.S. Environmental Protection Agency
Region 10
Seattle, WA

The Washington State Department of Ecology
Northwest Regional Office
Bellevue, WA

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Prepared by: AECOM
710 Second Avenue, Suite 1000 • Seattle, Washington • 98104

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D.1 Introduction

This appendix first provides the rationale for subdividing Area of Potential Concern 1 (AOPC 1) into smaller areas based on similar physical characteristics, similar risk-driver distribution patterns, proximity to potential sources, and other factors. Second, this appendix provides additional supporting information for the designation of recovery categories in each of these smaller areas, as described in Section 6.3.1 of the feasibility study (FS). The smaller areas are used to help organize and present this information. The recovery categories are used, in turn, to help identify appropriate remedial technologies in the development of remedial alternatives in Section 8.

D.2 Subdividing AOPC 1 into Areas with Similar Characteristics

The individual areas within AOPC 1 were delineated by grouping surface sediment samples with similar physical characteristics, similar risk-driver distribution patterns, proximity to potential sources, and other factors. Best professional judgment, site conditions, and understanding of the conceptual site model (CSM) were collectively used to refine "the edges" of the AOPC 1 footprint and manage small "slivers" that resulted from the geographic information system (GIS) mapping process. These subdivided areas are only approximate boundary estimates to be confirmed and modified during remedial design. They are grouped for tracking purposes and to facilitate assignment of recovery categories and remedial technologies in the FS.

Within the Lower Duwamish Waterway (LDW), contamination typically does not extend from one bank to the other. Where hot-spots are present, they typically exist on either the east or west benches of the LDW. Some commingling of risk drivers occurs across the navigation channel in Reach 1 but in general, the concentration gradients decline fairly rapidly with distance from shore. This delineation between the benches and the toe of the navigation channel slope was used when drawing the AOPC 1 boundary. These distribution patterns were also considered in the delineation of the 50 individual areas of AOPC 1 (Table D-1). See Section 6.1.1 for a definition of AOPC 1 and the criteria used to define it.

D.3 Assignment of AOPC 1 Areas to Recovery Categories

Section 6.3.1 of the FS describes how the LDW (downstream of river mile [RM] 4.75) was subdivided into three categories with respect to their potential for natural recovery, based on the criteria presented in Table 6-3. The recovery categories are:

- **Category 1** includes areas where recovery is presumed to be limited. It includes areas with observed and predicted scour, net scour, and empirical data demonstrating increasing concentrations over time.
- **Category 2** includes areas where recovery is less certain. It includes areas with net sedimentation and mixed empirical trends.

- **Category 3** includes areas where recovery is predicted. It includes areas with minimal scour potential, net sedimentation, and empirical trends of decreasing concentrations.

The subdivision of the LDW into these three recovery categories is shown on Figure 6-4a. The supporting information for each line of evidence considered in assigning recovery categories within AOPC 1 is provided in Table D-1. Empirical data trends are described in Appendix F and in Section 6.3.1. The empirical trend data resulted in a change to the recovery category designation in 18 areas; these changes are summarized in Table D-2.

Each area was assigned to the recovery category overlapping the majority of that area, as displayed in Figures D-1 through D-5. If two recovery categories occupied roughly equal acreage in an area, the lower numbered category was assigned. The assignment of a recovery category to each area is useful for remedial decision-making because it synthesizes all of the lines of evidence into one mapping layer, which points to the feasibility of using either enhanced natural recovery (ENR) or monitored natural recovery (MNR) as a remedial technology within an area (i.e., it describes the predicted ability of the area to recover naturally). However, this appendix only simplifies and presents the complex array of data into data tables; the assignment of remedial technologies in Section 8 is performed in GIS as a multi-layered mapping exercise.

Figures D-1 through D-5 display the areas identified in Table D-1, along with their recovery categories, core data, and resampled surface sediment locations. The maps also display the areas assigned to verification monitoring (described in Section 8). The verification monitoring areas are those with minor sediment quality standards exceedances in relatively old data (> 10 years old), isolated samples (i.e., only one sample with an exceedance in an approximate 0.5-acre or larger area), and no scour potential; all are assigned to Recovery Category 3. Figures D-1 through D-5 display the footprint of AOPC 2, although recovery category assignments in AOPC 2 are not displayed.

For all FS-level analyses and remedial decision-making, the AOPC boundaries are considered conservative and adequate. These boundaries will need to be verified and refined, as necessary, during remedial design and even, perhaps, during implementation of the remedial alternative.

D.4 Summary

The mapping layers presented in this appendix were used to delineate the AOPC 1 footprint and the recovery categories. This analysis supports the assignment of remedial technologies for individual areas in Section 8. Data from these layers are described on an area-by-area basis (of AOPC 1) in Table D-1. This table represents a way to organize and present data useful for decision-making and FS remedial alternative development.

D.5 References

Herrera 2004. *Summary Report, Lower Duwamish Waterway Outfall Survey.* Prepared for Seattle Public Utilities. Herrera Environmental Consultants, Inc., Seattle, WA. January 2004.

Table D-1 Lines of Evidence for Assigning Recovery Categories by Area within AOPC 1 Footprint

								Core Exceedances and Risk Driver		Core Trends in Top Two Intervals			Trends at Resampled Surface Sediment Locations			Conclusion[f]	
Area within AOPC 1 Footprint	River Mile	Location/ Description	Approx. Size (Acres)	STM 100-yr Max High-Flow Scour Deeper than 10 cm (Y/N)	STM Net Sedimentation Rate <1 cm/yr (Y/N)	Observed Vessel Scour (Y/N)[a]	Berthing Area (Y/N)	(Number of Cores) and Core IDs	Depth of SQS and CSL Exceedances (at any depth; ft)[b]	Cores Evaluated[c]	Total PCBs	Other Detected SQS Exceedances	New Station Name[d]	Total PCBs	Other Detected SQS Exceedances	Recovery Category (1, 2, or 3)	Best Professional Judgment Category Notes
FS Figures where Data are Presented				Figures 2-9 and F-22	Figures 2-11 and F-2	Figures 2-10 and F-22	Figure 2-28			Figures 6-4b, F-13, and F-22			Figures 6-4b, F-8, and F-22			Figures 6-4a, F-8, F-13, and F-22	
Area 1A	0	Harbor Island Marina	2.6	No	No	No	No	(1) SC-1	CSL 0-2', 1-1.5', 1.5-2' (PCBs); SQS 2-4', 0.5-1' (PCBs); 0-0.5' data pass, as shown on figure	SC-1	Decrease (based on 0.5-ft data)	Mixed (based on 0.5-ft data)	—	—	—	3	Although BEHP is increasing in core SC-1, this area was assigned to Recovery Category 3 because it is a marina with decreasing total PCB trends with no evidence of scour.
Area 1B	0	Harbor Island Marina	2.3	No	No	No	No	No cores	—	—	—	—	—	—	—	3	
Area 2	0.1 E	Ash Grove Cement	1.6	No	Yes	No	Yes	(1) SC-2	CSL 0-6' (PCBs, As, Pb, Zn)	SC-2	Equilibrium	Mixed	—	—	—	1	
Area 3	0.2 E	Ash Grove Cement	5.2	No	Yes	Yes	Yes	(1) SC-4	SQS 0-2' (PCBs, Hg, As); CSL 2-4' (2,4-Dimethylphenol)	SC-4	Decrease	Mixed	—	—	—	1	
Area 4A	0.1 - 0.2 W	Terminal 103 Park/ Ferguson	1.5	No, but most of area outside of STM	No, but most of area outside of STM	No	No	(1) SC-5	SQS 0-2.2' (PCBs, Hg)	SC-5	Increase	Equilibrium	—	—	—	2	
Area 4B	0.1 - 0.25 W	Terminal 103 Park/ Ferguson	2.0	No	No	No	No	No cores	—	—	—	—	SS-10, TRI-010	Below SQS, Below SQS	Decrease, Increase	3	
Area 5	0.25 - 0.4 W	General Recycling and Herring's House	6.2	No	No	Yes in part of area	Yes	(3) SC-6, SC-8, DR068	SC-6: CSL 2-4.5' (PCBs); DRO68: CSL 0-2' (PCBs); SC-8: SQS 0-1' (PCBs); CSL 1-10' (PCBs, BEHP, Hg, N-Nitrosodiphenylamine, and benzyl alcohol)	SC-6, SC-8, DR068	Below SQS, Decrease, Decrease	Below SQS, Mixed, Below SQS	TRI-016, SS-15	Equilibrium, Below SQS	Increase, Increase	1	
Area 6 A-E	0.3 - 0.55 E and navigation channel	Adjacent to Duwamish/ Diagonal EAA	21.8	No	No	No	No	(5) SC-7, SC-9, SC-10, DUD 250, DUD258	SC-7: SQS 0-1' (PCBs) CSL 1-1.7' (PCBs); SC-9: CSL 0-2.6' (PCBs); SC-10: SQS 0-1', 4-5', and 6-8' (PCBs), CSL 1-4' (BEHP, Hg); DUD250: CSL 0-3' (PCBs, BEHP); DUD 258: CSL 0-3' (BEHP), CSL 3-6' (PCBs).	SC-7, SC-9, SC-10	Decrease, Equilibrium, Equilibrium	Mixed, Mixed, Decrease	SS-17	Decrease	Mixed	3; VM in Area 6C	Although some of the older data exhibit mixed trends and equilibrium, these areas are around the EAA. Enhanced natural recovery was applied in Area 6C in 2005. Recovery category and technology assignments considered post-remedy monitoring data trends, which are presented in Appendices F and J.
Area 7A	0.5 - 0.6 W	Northwest of Kellogg Island	2.5	No	No	No	No	(1) SC-11	CSL 0-0.8' (PCBs)	SC-11	Increase	Mixed	—	—	—	1	
Area 7B-C	0.5 - 0.7 W	Northwest of Kellogg Island	6.4	No	No	No	No	No cores	—	—	—	—	—	—	—	3	
Area 7D	0.6 W	North of Kellogg Island	2.7	No	No	No	No	(2) SC-12, DRO44	SC-12: SQS 0-2' (PCBs), CSL 2-6.6' (PCBs, Hg); DR044: CSL 2-4' (PCBs)	SC-12, DR044	Equilibrium, Lack of Data Density	Increase, Increase	—	—	—	2	
Area 7E	0.5 - 0.55 W	North of Kellogg Island	0.8	No	No	No	No	No cores	—	—	—	—	—	—	—	3 (VM)	
Area 7F	0.7 W	North of Kellogg Island	1.1	No	No	No	No	No cores	—	—	—	—	—	—	—	3 (VM)	
Area 8A	0.85 W	West side of Kellogg Island	1.6	No	Yes	No	No	No cores	—	—	—	—	—	—	—	3	Although the net sedimentation rate does not exceed 1 cm/yr, these areas are not subject to scour and have relatively low surface sediment concentrations.

Table D-1 Lines of Evidence for Assigning Recovery Categories by Area within AOPC 1 Footprint (continued)

								Core Exceedances and Risk Driver		Core Trends in Top Two Intervals			Trends at Resampled Surface Sediment Locations			Conclusion[f]	
Area within AOPC 1 Footprint	River Mile	Location/ Description	Approx. Size (Acres)	STM 100-yr Max High-Flow Scour Deeper than 10 cm (Y/N)	STM Net Sedimentation Rate <1 cm/yr (Y/N)	Observed Vessel Scour (Y/N)[a]	Berthing Area (Y/N)	(Number of Cores) and Core IDs	Depth of SQS and CSL Exceedances (at any depth; ft)[b]	Cores Evaluated[c]	Total PCBs	Other Detected SQS Exceedances	New Station Name[d]	Total PCBs	Other Detected SQS Exceedances	Recovery Category (1, 2, or 3)	Best Professional Judgment Category Notes
FS Figures where Data are Presented				Figures 2-9 and F-22	Figures 2-11 and F-2	Figures 2-10 and F-22	Figure 2-28			Figures 6-4b, F-13, and F-22			Figures 6-4b, F-8, and F-22			Figures 6-4a, F-8, F-13, and F-22	
Area 8B	0.7 - 0.85 W	West side of Kellogg Island	4.1	No	Yes	No	No	No cores	—	—	—	—	—	—	—	3 (VM)	
Area 8C	0.9 - 0.95 W	West side of Kellogg Island	2.2	No	No	No	No	No cores	—	—	—	—	—	—	—	3 (VM)	
Area 9A	0.8 - 0.9 navigation channel	East of Kellogg Island	3.6	No	No	No	No	(2) SC-13, SC-14	SC-13: SQS 0-2; (PCBs); SC-14: CSL 0-6' (PCBs, Hg), SQS 6-8.6' (Hg)	SC-13, SC-14	Equilibrium, Decrease	Lack of Data Density, Decrease	SSB2b	Increase	Below SQS	2	
Area 9B	0.8 - 0.9 W	East of Kellogg Island	2.3	No	No	No	No	No cores	—	—	—	—	—	—	—	3 (VM)	
Area 10A	Slip 1	Head of Slip 1	4.4	No	No	Yes	Yes	(1) SC-17	CSL 0-4' and 6-8.6' (PCBs, Hg, Zn, Cd)	SC-17	Decrease	Mixed	SS-31, SS-32	Below SQS, Below SQS	Equilibrium, Decrease	2	Decreasing trends override the scour potential.
Area 10B	Slip 1	Slip 1	5.0	No	No	Yes	Yes	(6) SC-15, SC-16, SC-18, DRO21, C2 and C3	SC-15: SQS 0-4', CSL 4-6' (PCBs); SC-16: SQS 0-2', CSL 2-6' (PCBs); DRO21: SQS 0-2', CSL 2-4' (PCBs); C2: SQS 0-4' (PCBs)	SC-15, SC-16, SC-18, DR021	Equilibrium, Equilibrium, Increase, Equilibrium	Below SQS, Decrease, Increase, Increase	SS-319	Increase	Increase	1	
Area 11A	0.95 - 1.0 W	Lafarge berth	4.7	No	No	Yes	Yes	(1) SC-19	SQS 1-6', CSL 6-7' (PCBs)	SC-19	Equilibrium	Below SQS	DR048	Below SQS	No data	2	
Area 11B	1.05 W	Lafarge berth	1.1	No	No	Yes	Yes	(1) SC-21	SQS 0-1' and 2-4', CSL 4-6.2' (PCBs)	SC-21	Increase	Below SQS	—	—	—	1	
Area 11C	1.0 - 1.1 navigation channel	Navigation Channel	3.4	No	No	Yes in portion of area outside of navigation channel	No	(1) SC-20	CSL 0-2', SQS 2-6' (PCBs)	SC-20	Increase	Equilibrium	SS-37	Increase	Mixed	2	
Area 12	1.1 E	Lehigh NW	0.4	No	No	No	No	(1) SC-22	below SQS	SC-22	Below SQS	Below SQS	—	—	—	3	
Area 13	1.1 - 1.2 navigation channel	Navigation Channel	2.7	No	No	No	No	No cores	—	—	—	—	SS-40	Equilibrium	Below SQS	3	
Area 14A	1.25 - 1.45 W	Duwamish Shipyard	2.7	No	No	Yes	Yes	(4) SC-25, SC-26, SC-28, DR054	SC-25: SQS 0-2' (PCBs), CSL 2-6' (As, Zn, Cu); SC-26: SQS 0-1' and 11-12.1' (PCBs), CSL 2-4' and 6-8' (PCBs, Cu, Hg, 1,2-Dichlorobenzene, As, BEHP, Pb, Pentachlorophenol, Zn); SC-28: CSL 0-1' and 5.5-7.5' (PCBs, As, benzyl alcohol, 1,2-Dichlorobenzene, Cu, Hg, Pb, Zn), SQS 1-2' and 12-12.6' (PCBs); DR054: CSL 0-4' (As, Cu, Zn, Pb, Hg)	SC-25, SC-26, SC-28, DR054 (using surface vs. 0-2')	Equilibrium, Equilibrium, Equilibrium, Decrease	Equilibrium, Below SQS, Increase, Decrease	TRI-045	Equilibrium	Increase	1	
Area 14B	1.2 - 1.25 W	North of Duwamish Shipyard	1.0	No	No	Yes	Yes	(1) SC-24	SQS 0-1' (PCBs)	SC-24	Increase	Below SQS	—	—	—	1	

Table D-1 Lines of Evidence for Assigning Recovery Categories by Area within AOPC 1 Footprint (continued)

								Core Exceedances and Risk Driver		Core Trends in Top Two Intervals			Trends at Resampled Surface Sediment Locations			Conclusion[f]	
Area within AOPC 1 Footprint	River Mile	Location/ Description	Approx. Size (Acres)	STM 100-yr Max High-Flow Scour Deeper than 10 cm (Y/N)	STM Net Sedimentation Rate <1 cm/yr (Y/N)	Observed Vessel Scour (Y/N)[a]	Berthing Area (Y/N)	(Number of Cores) and Core IDs	Depth of SQS and CSL Exceedances (at any depth; ft)[b]	Cores Evaluated[c]	Total PCBs	Other Detected SQS Exceedances	New Station Name[d]	Total PCBs	Other Detected SQS Exceedances	Recovery Category (1, 2, or 3)	Best Professional Judgment Category Notes
FS Figures where Data are Presented				Figures 2-9 and F-22	Figures 2-11 and F-2	Figures 2-10 and F-22	Figure 2-28			Figures 6-4b, F-13, and F-22			Figures 6-4b, F-8, and F-22			Figures 6-4a, F-8, F-13, and F-22	
Area 15A	1.3 E	Saint Gobain	1.1	No	No	No	No	No cores	—	—	—	—	—	—	—	3	
Area 15B	1.4 E	Saint Gobain	0.8	No	No	No	No	(1) SC-27	CSL 0.5-1.0', 1.0-1.5', 1.5-2.0', and 0-2' (PCBs), SQS 0-0.5' and 2.0-3.5' (PCBs)	SC-27	Decrease	Equilibrium	SS-50	Decrease	Equilibrium	3	
Area 16A	1.4-1.5 W	Head of Glacier Bay	4.6	Outside of STM domain	Outside of STM domain	No bathymetry data	No	(1) SC-29	below SQS	SC-29	Below SQS	Equilibrium	SS-57	Equilibrium	Equilibrium	3	Minimal scour potential is expected because this area is behind a pier.
Area 16B	1.4-1.5 W	Mouth of Glacier Bay	2.8	No	No	Yes	Yes	(7) SCDMMU1, SCDMMU1R, SCDMMU2, SCDMMU2R, SCDMMU3, SCDMMU3R, C-1	SCDMMU2R: CSL 3-4' (Hg); SCDMMU3: CSL 0-5.6' (arsenic); C-1: SQS 0-4' (PCBs, arsenic); 1R and 3R not analyzed for SMS contaminants	—	—	—	no trend data, but high surface concentrations			1	
Area 17	1.45 - 1.5 navigation channel	Navigation Channel near Glacier Bay	2.4	No; but portion of area is outside of STM	No; but portion of area is outside STM	No	Yes	No cores	—	—	—	—	—	—	—	2	
Area 18A	1.55 - 1.6 E	Downstream of Slip 2	0.5	No	No	Yes	No	(1) SC-30	below SQS	—	—	—	—	—	—	1	
Area 18B	1.55 - 1.6 E	Downstream of Slip 2	0.6	No	No	Yes	No	(1) C-4	below SQS	—	—	—	—	—	—	1	
Area 18C	1.65 - 1.7 E	Downstream of Slip 2	0.8	No	No	Yes, in portion	No	No cores	—	—	—	—	—	—	—	3	
Area 18D	1.65 - 1.7 E	Downstream of Slip 2	1.5	No	No	Yes	Yes	(17) SC-31, Hardie Gypsum-1: 2, 3, 4, 5; Hardie Gypsum-2: A, 2b, B, C, 3, 4, 5.2, D, E; Lone Star Hardie Gypsum: c-1, c-2, c-3	SC-31: SQS 0-2.8' (PCBs); C SQS 0-3' (phenanthrene); D SQS 0-3' (PCBs, Hg); 2 SQS 0-4' (PCBs); E SQS 0-3' (PCBs)	—	—	—	—	—	—	1	
Area 19	Slip 2	Slip 2	3.6	No	No	Yes at mouth of slip	Yes	(1) SC-32	SQS 0-1' (PCBs); CSL 1-2 (PCBs, acenaphthene, dibenzofuran, fluorene), 2-4' (PCBs)	SC-32	Decrease	Mixed	SS-63	Below SQS	Below SQS	3	Although vessel scour was observed at the mouth of Slip 2, sedimentation up to 3 cm/yr is expected, and empirical data demonstrate decreases in risk-driver concentrations over time. Therefore, this area is assigned to Recovery Category 3.

Table D-1 Lines of Evidence for Assigning Recovery Categories by Area within AOPC 1 Footprint (continued)

								Core Exceedances and Risk Driver		Core Trends in Top Two Intervals			Trends at Resampled Surface Sediment Locations			Conclusion[f]	
Area within AOPC 1 Footprint	River Mile	Location/ Description	Approx. Size (Acres)	STM 100-yr Max High-Flow Scour Deeper than 10 cm (Y/N)	STM Net Sedimentation Rate <1 cm/yr (Y/N)	Observed Vessel Scour (Y/N)[a]	Berthing Area (Y/N)	(Number of Cores) and Core IDs	Depth of SQS and CSL Exceedances (at any depth; ft)[b]	Cores Evaluated[c]	Total PCBs	Other Detected SQS Exceedances	New Station Name[d]	Total PCBs	Other Detected SQS Exceedances	Recovery Category (1, 2, or 3)	Best Professional Judgment Category Notes
FS Figures where Data are Presented				Figures 2-9 and F-22	Figures 2-11 and F-2	Figures 2-10 and F-22	Figure 2-28			Figures 6-4b, F-13, and F-22			Figures 6-4b, F-8, and F-22			Figures 6-4a, F-8, F-13, and F-22	
Area 20	1.8 - 1.9 W	Terminal 115	2.3	No	No	Yes	Yes	(6) SC-34, SC-203, S1-01, S1-02, S2-01, S2-02	SC-34: SQS 0-1' (butyl benzyl phthalate, benzyl alcohol, BEHP), CSL 1-2' (benzyl alcohol, BEHP); SC 203: SQS 0-1' (benzyl alcohol, BEHP, butyl benzyl phthalate, dimethyl phthalate), CSL 1-4' (BEHP, dimethyl phthalate); S1-01: CSL 0-3' (chrysene, fluoranthene, total benzofluoranthenes); S1-02: SQS 3-4' (chrysene, fluoranthene, total HPAHs); S2-01: CSL 0-3' (BEHP), SQS 3-6' (PCBs); S2-02: SQS 3-4' and CSL 4-5' (BEHP).	SC-34, SC-203	Below SQS, Below SQS	Mixed, Mixed	SS-70	Below SQS	Mixed	1	Empirical trends were not used to change from Recovery Category 1 to 2 because the data were located in a small portion of area.
Area 21A	1.9 - 2.0 E	First Ave Bridge, Duwamish Marine Center	1.1	No	No	No	No	(2) SC-33, SC 201	SC-33: CSL 0-2', SQS 2-6' (PCBs); SC 201: CSL 0-1.5', SQS 1.5-6' (PCBs)	SC-33	Equilibrium	Lack of Data Density	—	—	—	3	
Area 21B	RM 2.0 E	Downstream of Slip 3; under First Avenue Bridge	0.5	No	No	No	No	No cores	—	—	—	—	—	—	—	3	
Area 22A	1.95 - 2.0 W	North of First Avenue Bridge/Terminal 115	0.7	No	No	No	Yes	(1) SC-35	SQS 0-2' (PCBs)	—	—	—	SS-75	Decrease	Below SQS	2	
Area 22B	1.95 - 2.0 navigation channel	Navigation Channel RM 1.95-2.0	0.9	No	No	No	No	(2) S11, S12	S11: 0-4' (PCBs); S12: 0-4' (PCBs)	—	—	—	—	—	—	3	
Area 23	2.1 - 2.2 W	Alaska Marine Lines, south of First Ave Bridge	2.2	No	No	No	Yes	(2) SC-38 and SC-39	SC-38: SQS 0-2', CSL 2-3' (PCBs); SC-39: SQS 0-1' and 2-4', CSL 1-2' (PCBs)	SC-38, SC-39	Equilibrium, Equilibrium	Below SQS, Below SQS	—	—	—	2	
Area 24A	2.05 - 2.2 E	Mouth and upstream of Slip 3	3.3	No	No	No	Yes	(1) DR112	—	DR112	Lack of Data Density	Increase	SS-81	Decrease	Below SQS	2	
Area 24B	2.1 - 2.15 navigation channel	Navigation Channel	1.3	No	No	No	No	(1) B2	SQS 4-8' (PCBs)	—	—	—	—	—	—	3	
Area 25	Slip 3	Head of Slip 3	1.8	No	No	Yes	Yes	(1) SC-37	CSL 0-4' (As, 1,2,4-Trichlorobenzene, 1,2-Dichlorobenzene, Cu, Pb, Zn)	SC-37	Decrease	Mixed	—	—	—	2	
Area 26	2.2 W	Trotsky Inlet	2.1	No	No	No	No	(1) SC-40	SQS 0-1.3' (PCBs)	SC-40	Increase	Below SQS	B5a-2	Decrease	-	2	Although the Trotsky Inlet is assigned to Category 2, it is actively remediated by Alternative 2 because of high surface sediment concentrations. It contains 2 total PCB samples that were removed as outliers from the baseline interpolation and site-wide spatially-weighted average concentration calculation.

Table D-1 Lines of Evidence for Assigning Recovery Categories by Area within AOPC 1 Footprint (continued)

								Core Exceedances and Risk Driver		Core Trends in Top Two Intervals			Trends at Resampled Surface Sediment Locations			Conclusion[f]	
Area within AOPC 1 Footprint	River Mile	Location/ Description	Approx. Size (Acres)	STM 100-yr Max High-Flow Scour Deeper than 10 cm (Y/N)	STM Net Sedimentation Rate <1 cm/yr (Y/N)	Observed Vessel Scour (Y/N)[a]	Berthing Area (Y/N)	(Number of Cores) and Core IDs	Depth of SQS and CSL Exceedances (at any depth; ft)[b]	Cores Evaluated[c]	Total PCBs	Other Detected SQS Exceedances	New Station Name[d]	Total PCBs	Other Detected SQS Exceedances	Recovery Category (1, 2, or 3)	Best Professional Judgment Category Notes
FS Figures where Data are Presented				Figures 2-9 and F-22	Figures 2-11 and F-2	Figures 2-10 and F-22	Figure 2-28			Figures 6-4b, F-13, and F-22			Figures 6-4b, F-8, and F-22			Figures 6-4a, F-8, F-13, and F-22	
Area 27A	2.4 E	Seattle Boiler Works	0.7	No	No	Yes	Yes	(1) SC-41	SQS 0-1' and 4-8' (PCBs)	SC-41	Equilibrium	Below SQS	—	—	—	1	
Area 27B	2.3 - 2.4 E	Seattle Boiler Works	2.3	No	No	Yes	Yes	No cores	—	—	—	—	—	—	—	1	
Area 27C	2.36 - 2.4 W	Upstream of Trotsky Inlet	0.6	No	No	Yes	No	No cores	—	—	—	—	DR141	Below SQS	No data	1	
Area 27D	2.0 - 2.5 W	Upstream of Trotsky Inlet	0.9	No	No	No	No	No cores	—	—	—	—	—	—	—	2	
Area 28A	2.4 - 2.5 W	Hurlen-Boyer	1.3	No	No	Yes	Yes	(5) C5, C6,WRC-SS-B1, WRC-SS-B2, WRC-SS-B3	C6: SQS 0-3.8' (PCBs)	WRC-SS-B1, WRC-SS-B2, WRC-SS-B3	Lack of Data Density, Lack of Data Density, Lack of Data Density	Below SQS, Below SQS, Increase	—	—	—	1	Most surface data below the SQS.
Area 28B	2.4 - 2.5 Nav Channel	Navigation Channel	0.8	No	No	No	No	(1) S15	SQS 0-4' (PCBs)	—	—	—	—	—	—	3	
Area 29	2.5 E	Alaska Washington Building Materials Co.	0.7	No	No	Yes	Yes	No cores	—	—	—	—	—	—	—	1	
Area 30A	2.55 W	Beach 5a	2.7	No	No	No bathymetry data	Yes	(1) Hurlen-Boyer: C1	below SQS	—	—	—	—	—	—	2	
Area 30B	2.7 W	South end Beach 5a and south of beach	2.1	No	No	Yes	Yes	(3) SC-46; Hurlen-Boyer: C2, C3	SC-46: SQS 0-4' (PCBs, benzyl alcohol, fluoranthene, hexachlorobenzene); C2: SQS 0-4.2' (fluoranthene, total HPAHs); C3: CSL 0-3.3' (Acenaphthene)	SC-46	Equilibrium	Mixed	—	—	—	1	
Area 31A	2.6 - 2.7 E	Downstream of Slip 4	2.7	No	No	No	No	(2) SC-43, SC-44	SC-44: SQS 0-3.2' (PCBs)	SC-44	Decrease	Lack of Data Density	SS-88	Equilibrium	No data	3	
Area 31B	2.7 - 2.8 E	Downstream of Slip 4	1.5	No	No	Some at upstream end	No	(1) SC-45	SQS 0-4' (PCBs)	SC-45	Equilibrium	Below SQS	SS-92, SS-94	Increase, Below SQS	No data, Decrease	2	
Area 32	2.8 - 2.9 W and navigation channel	Morton	4.3	Yes	No	Yes	Yes	(1) Hurlen Boyer: C4	—	—	—	—	TRI-096	Below SQS	Increase	1	
Area 33a	Slip 4	Mouth of Slip 4	3.4	No	No	Yes	Yes	(7) Crowley DMMUs 2-4, SC06, SC08, SC09, SC10	DMMUs: 0-4' SQS (PCBs and PAHs); SC06: SQS 0-6' (PCBs)	SC06	Equilibrium	Lack of Data Density	DR-181	Decrease	Increase	3 (VM)	The mouth of Slip 4 has some vessel scour, but was assigned to Category 3 based on area-wide empirical chemical trends that demonstrate recovery (no co-located data).

Table D-1 Lines of Evidence for Assigning Recovery Categories by Area within AOPC 1 Footprint (continued)

								Core Exceedances and Risk Driver		Core Trends in Top Two Intervals			Trends at Resampled Surface Sediment Locations			Conclusion[f]	
Area within AOPC 1 Footprint	River Mile	Location/ Description	Approx. Size (Acres)	STM 100-yr Max High-Flow Scour Deeper than 10 cm (Y/N)	STM Net Sedimentation Rate <1 cm/yr (Y/N)	Observed Vessel Scour (Y/N)[a]	Berthing Area (Y/N)	(Number of Cores) and Core IDs	Depth of SQS and CSL Exceedances (at any depth; ft)[b]	Cores Evaluated[c]	Total PCBs	Other Detected SQS Exceedances	New Station Name[d]	Total PCBs	Other Detected SQS Exceedances	Recovery Category (1, 2, or 3)	Best Professional Judgment Category Notes
FS Figures where Data are Presented				Figures 2-9 and F-22	Figures 2-11 and F-2	Figures 2-10 and F-22	Figure 2-28			Figures 6-4b, F-13, and F-22			Figures 6-4b, F-8, and F-22			Figures 6-4a, F-8, F-13, and F-22	
Area 33B	RM 2.85 W	Mouth and outside of Slip 4	0.3	No	No	Yes	No	(2) Crowley DMMU 1, SC11	DMMU 1: 0-4' SQS (PCBs and PAHs)	—	—	—	—	—	—	1	
Area 34	3.0 W	South of Morton	0.3	No	Yes	No	No	No cores	—	—	—	—	—	—	—	3 (VM)	Although the net sedimentation rate does not exceed 1 cm/yr, this area is not subject to scour and has relatively low surface sediment concentrations.
Area 35A	3.05 W	South of Morton	0.3	No	No	No	No	(1) SC-47	—	SC-47	Decrease	Below SQS	—	—	—	3	
Area 35b	3.2 W	West of Boeing Plant 2/ Jorgensen Forge EAA	0.6	No	No	No	No	No cores	—	—	—	—	—	—	—	3	
Area 35C	3.25 - 3.28 W	West of Boeing Plant 2/ Jorgensen Forge EAA	0.6	No	No	No	No	No cores	—	—	—	—	—	—	—	3 (VM)	
Area 35D	3.3 - 3.35 W	Downstream of South Park Bridge	0.7	No	No	No	No	(1) SB-5	CSL 2.5-5' (PCBs), SQS 0-2.5' and 5-7.5' (PCBs), 72.5 - 75' (BEHP, Butyl benzyl phthalate)	—	—	—	—	—	—	3 (VM)	
Area 36	3.05 - 3.1 navigation channel	South of Morton	1.1	Yes	No	No	No	(1) DU9007XX	CSL 0-5' (PCBs)	—	—	—	—	—	—	1	
Area 37A	3.5 W	South Park Marina	0.7	No	No	No	No	(6) T117-SE-COMP1-SC, T117-SE-91-SC, 93-SC, 94-SC, T117-SE-COMP4-SC, T117-SE-COMP2 and 3-SC	T117-SE-COMP2 and 3-SC: SQS 0-2' (PCBs)	—	—	—	—	—	—	3	
Area 37B	3.7 - 3.75 W	Upstream of Terminal 117 EAA	0.6	No	No	No	No	No cores	—	—	—	—	113-G, 114-G, 117-G, SS-113b	Below SQS, Below SQS, Below SQS, Below SQS	Below SQS, Below SQS, Below SQS, Below SQS	3	
Area 38	3.0 - 3.6 navigation channel	In navigation channel near Boeing Plant 2 / Jorgensen Forge EAA	0.8	Yes	No	No	No	(3) SC-49a, 49b, DU9002XX	SC-49a: CSL 0-1' (benzoic acid, benzyl alcohol), SQS 2-8' (PCBs); SC-49b: 9-10' SQS (hexachlorobutadiene, only analyzed for some contaminants); DU9002XX: 0-7' SQS (PCB)	SC-49	Below SQS	Increase	—	—	—	1	
Area 39	3.75 - 3.8 W	Upstream of Terminal 117 EAA	0.6	Yes	No	No	No	No cores	—	—	—	—	—	—	—	3 (VM)	Only small portions of this area (in the navigation channel) have high-flow scour deeper than 10 cm. This area is assigned to VM because of one isolated, old (1998) SQS exceedance.

Table D-1 Lines of Evidence for Assigning Recovery Categories by Area within AOPC 1 Footprint (continued)

								Core Exceedances and Risk Driver		Core Trends in Top Two Intervals			Trends at Resampled Surface Sediment Locations			Conclusion[f]	
Area within AOPC 1 Footprint	River Mile	Location/ Description	Approx. Size (Acres)	STM 100-yr Max High-Flow Scour Deeper than 10 cm (Y/N)	STM Net Sedimentation Rate <1 cm/yr (Y/N)	Observed Vessel Scour (Y/N)[a]	Berthing Area (Y/N)	(Number of Cores) and Core IDs	Depth of SQS and CSL Exceedances (at any depth; ft)[b]	Cores Evaluated[c]	Total PCBs	Other Detected SQS Exceedances	New Station Name[d]	Total PCBs	Other Detected SQS Exceedances	Recovery Category (1, 2, or 3)	Best Professional Judgment Category Notes
FS Figures where Data are Presented				Figures 2-9 and F-22	Figures 2-11 and F-2	Figures 2-10 and F-22	Figure 2-28			Figures 6-4b, F-13, and F-22			Figures 6-4b, F-8, and F-22			Figures 6-4a, F-8, F-13, and F-22	
Area 40	3.9 - 3.95 W	Upstream of Terminal 117 EAA	0.4	No	No	Yes	No	No cores	—	—	—	—	—	—	—	3 (VM)	This area has evidence of vessel scour outside of a berthing area, but the other physical parameters support assignment to Category 3. Additionally, the area was delineated to encompass one, isolated SQS exceedance.
Area 41A	3.7 - 4.0 E	Near Central King County International Airport Source Control Area	5.1	Yes	No	No	No	(9) SC-50, SC-51, SC-52, DR220, AN-041, AN-042, AN-043, AN-044, SB-13	SC-50: CSL 0-2.8' (PCBs, As, BEHP); SC-51: CSL 0-2', SQS 2-3.8'; SC-52: CSL 0-1' (PCBs); DR220: SQS 0-2' (PCBs); AN-041: CSL 0-1' (PCBs); AN-042: CSL 0-2' (PCBs); AN-043: SQS 0-1' (PCBs, Butyl benzyl phthalate) CSL 1-2' (PCBs, 2,4 Dimethylphenol, Cd, Cr, Pb, Hg, Zn); AN-044: CSL 0-1' (PCBs) SQS 1-2' (PCBs); SB-13: SQS 0.33-0.69' (Dibenzo(a,h)anthracene).	SC-50, SC-51, SC-52, DR220, AN-041, AN-042, AN-043, AN-044	Increase, Decrease, Increase, Decrease, Increase, Equilibrium, Decrease, Increase	Increase, Mixed, Increase, Below SQS, No data, No data, Decrease, Increase	SS-115, SS-121, SS-123, AN-019, SS-119	Equilibrium, Decrease, Decrease, Increase, Equilibrium	Mixed, No data, No data, Below SQS, Decrease	2	High-flow scour is predicted near the navigation channel. This area is assigned to Recovery Category 2 because scour was not observed for most of the area (along the shore) and because the empirical data demonstrate mixed results.
Area 41B	3.75 - 3.8 navigation channel	Navigation Channel	0.6	Yes	Yes	No	No	(1) DU9121XX	SQS 0-4' (PCBs)	—	—	—	—	—	—	1	
Area 41C	3.95 navigation channel	Navigation Channel	0.4	Yes	No	No	No	(2) DU9001XX, DU9119XX	DU9001XX: SQS 0-5' (pentachlorophenol)	—	—	—	—	—	—	1	
Area 42A	4.1 E	Downstream of Slip 6	2.9	No	No	Yes	No	(12) SB-11, SB-12, SH-01 through SH-09, ST-21	SB-12: CSL 0.33-0.69' (Benzoic acid); SH-01: CSL 0.33-0.82' (Diethyl phthalate, Pentachlorophenol);SH-02: SQS 0.33-0.82' (PCBs, Dibenzo(a,h) anthracene, Di-n-octyl phthalate); SH-04: CSL 0.33-0.82 (PCBs, Pentachlorophenol, Dibenzo(a,h)anthracene); SH-07: CSL 0.33-0.82' (Benzoic acid); SH-08: SQS 0.33-0.82' (Dibenzo(a,h)anthracene)	SB-12, SH-03, SH-06, SH-09	Below SQS, Below SQS, Increase, Below SQS	Mixed, Mixed, Equilibrium, Below SQS	SS-126, B8b	Below SQS for both	Below SQS, No data	1	

Table D-1 Lines of Evidence for Assigning Recovery Categories by Area within AOPC 1 Footprint (continued)

								Core Exceedances and Risk Driver		Core Trends in Top Two Intervals			Trends at Resampled Surface Sediment Locations			Conclusion[f]	
Area within AOPC 1 Footprint	River Mile	Location/ Description	Approx. Size (Acres)	STM 100-yr Max High-Flow Scour Deeper than 10 cm (Y/N)	STM Net Sedimentation Rate <1 cm/yr (Y/N)	Observed Vessel Scour (Y/N)[a]	Berthing Area (Y/N)	(Number of Cores) and Core IDs	Depth of SQS and CSL Exceedances (at any depth; ft)[b]	Cores Evaluated[c]	Total PCBs	Other Detected SQS Exceedances	New Station Name[d]	Total PCBs	Other Detected SQS Exceedances	Recovery Category (1, 2, or 3)	Best Professional Judgment Category Notes
FS Figures where Data are Presented				Figures 2-9 and F-22	Figures 2-11 and F-2	Figures 2-10 and F-22	Figure 2-28			Figures 6-4b, F-13, and F-22			Figures 6-4b, F-8, and F-22			Figures 6-4a, F-8, F-13, and F-22	
Area 42B	Slip 6	Slip 6	4.9	No	No	Yes	Yes	(11) SC-53, DR246, SB-1, SB-2, SB-3, SB-4, SB-5, SB-6, SB-7, SB-8, SB-17.	SB-1: SQS 0.33-0.69'(Benzo(g,h,i) perylene, Bis(2-ethylhexyl)phthalate, Dibenzo(a,h)anthracene, Indeno(1,2,3-cd)pyrene); SB-2: SQS 0.33-0.69' (Dibenzo(a,h)anthracene); SB-3: CSL 0.33-0.69' (Benzoic acid, Phenol); SB-4: CSL 0.33-0.69' (Benzoic acid); SB-5: CSL 0.33-0.69' (Benzoic acid); SB-6: CSL 0.33-0.69' (Benzoic acid); SB-7: CSL 0.33-0.69' (Benzoic acid); SB-8: CSL 0.33-0.69' (Benzoic acid); SB-17: CSL 0.33-0.69' (Benzoic acid).	DR246, SB-1, SB-3, SB-4, SB-8	Lack of data density in all cores for total PCB trends	Below SQS, Equilibrium, Mixed, Mixed, Equilibrium	SS-127, SB-1, SS-129, SS-130	Below SQS for all	3 decreases, 1 increase	1 (whole area contains 1, 2, 3)	Slip 6 contains all three recovery categories, but this area is assigned to Category 1 because a large proportion of Slip 6 has observed vessel scour.
Area 43	4.25 - 4.3 W	Upstream of Delta Marine	0.4	No	No	No	No	No cores	—	—	—	—	—	—	—	3 (VM)	
Area 44	4.35 E	Upstream of Slip 6	0.2	No	No	No	No	No cores	—	—	—	—	—	—	—	3 (VM)	
Area 45	4.5 - 4.6 E	Northeast of Upper Turning Basin	0.6	No	No	No	No	No cores	—	—	—	—	—	—	—	3 (VM)	
Area 46	4.7 W	Southwest corner of Upper Turning Basin	1.3	Yes	No	No bathymetry data	No	(1) SC-56	SC-56: SQS 0-2' (PCBs)	—	—	—	SS-148	Decrease	Decrease	1	This area overlaps Recovery Categories 1 and 3.
Area 47	4.7 - 4.8E	East of the Upper Turning Basin	0.9	No	No	No	No	No cores	—	—	—	—	—	—	—	3 (VM)	
Area 48	4.9 E	Norfolk EAA	1.0	Upstream of STM domain	Upstream of STM domain	Upstream of bathymetry data	No	(2) SC-55, NFK207	NFK207: 0-1' CSL (1,4-Dichlorobenzene)	SC-55, NFK207	Increase, Below SQS	Below SQS, Mixed	—	—	—	unassigned; upstream of STM domain[f]	Area will be considered to be like Recovery Category 2 during technology assignments.
Area 49	5.0 W	East of Norfolk EAA	0.2	Upstream of STM domain	Upstream of STM domain	Upstream of bathymetry data	No	No cores	—	—	—	—	—	—	—	unassigned; upstream of STM domain (VM)[f]	
Area 50	4.6 E	East of Upper Turning Basin	0.2	Yes	No	No	No	No cores	—	—	—	—	—	—	—	1	

Number of areas in recovery category:	1	29
	2	16
	3	43
	Unassigned (above RM 4.75)	2
Number of areas assigned to verification monitoring:		16

Notes:

— = no data or Lack of Data Density in cores for trends evaluation.

For empirical data, decreases and increases are ≥ 50% changes in concentration; equilibrium is a concentration change less than 50%; and mixed results indicate that not all SMS contaminants evaluated at a location have the same trends. Only detected contaminants exceeding the SQS were evaluated.

a. Observed vessel scour identified from sun-illuminated 2003 bathymetric data.

b. Only core sample intervals with detected SQS exceedances listed in this column; samples below the SQS and undetected are not listed. Exceedances in 0.5-ft interval samples are shown if they influence the mapping of the cores on Figures D-1 to D-5. For cores with similar exceedances in consecutive sampling intervals, the total depth across the exceedance is noted, as opposed to the depths of each sample; for example, SQS exceedances in the 0-1 ft, 1-2 ft, and 2-4 ft intervals are identified as 0-4 ft in this column. For samples with CSL exceedances, the risk drivers having SQS exceedances (but not CSL exceedances) are not listed, such that only the maximum exceedance status for each sample within a core is reported.

c. Only cores with appropriate vertical sample resolution were evaluated: 1-ft thick or shorter intervals, or a 0- to 2-ft interval with a co-located surface sediment location. See Appendix F for risk-driver data and trends.

Table D-2 Empirical Overrides of Recovery Category Assignments within AOPC 1 Footprint

Area	River Mile	Recovery Category[a] Based on Physical Considerations	Recovery Category Conclusion Based on Empirical Data	
			Final Recovery Category (1, 2, or 3)	Best Professional Judgment Category Override Notes
Area 4A	0.1 - 0.2 W	2 or 3	2	Area 4A is Category 2 because of equilibrium and increasing empirical trends.[b]
Area 7A	0.5 - 0.6 W	3	1	Portion of Area 7A is outside of STM domain and includes increasing and mixed empirical trends.
Area 7D	0.6 W	3	2	Area 7D was changed from Category 3 to 2 because of equilibrium and increasing empirical trends.[b]
Area 8A	0.85 W	1	3	Although the net sedimentation rate is below 1 cm/yr, these areas are not subject to scour and have relatively low surface sediment concentrations.
Area 8B	0.7 - 0.85 W	1	3 (VM)	
Area 9A	0.8 - 0.9 navigation channel	3	2	Area 9A was changed from Category 3 to 2 because of a mixture of empirical trends. Additionally, this area is predicted to have high-flow scour deeper than 2 cm (but not deeper than 10 cm).
Area 10A	Slip 1	1	2	Combination of equilibrium and decreasing/mixed empirical trends override the scour potential.
Area 11A	0.95 - 1.0 W	1	2	Area 11A changed from Category 1 to 2 because of low risk-driver concentrations and total PCBs in equilibrium in a core.
Area 18C	1.65 - 1.7 E	2	3	Vessel scour was only identified in a small portion of this area. This area is behind a pier.
Area 19	Slip 2	2	3	Although vessel scour was observed at the mouth of Slip 2, sedimentation up to 3 cm/yr is expected, and empirical data demonstrate decreases in risk-driver concentrations over time. Therefore, this area is assigned to Category 3.
Area 25	Slip 3	1	2	Area 25 was changed from Category 1 to 2 because of decreasing total PCB concentrations.
Area 26	2.2 W	3	2	Trotsky Inlet was changed from Category 3 to 2 because of mixed empirical trends.
Area 27D	2.0 - 2.5 W	3	2	Area 27D is a marina (not considered a berthing area). Therefore, the physical considerations alone would suggest Category 3, but changed to Category 2 because of elevated total PCBs in the surface sediment. However, there are no empirical trend data in Area 27D.
Area 33A	Slip 4	1	3 (VM)	The mouth of Slip 4 has some vessel scour, but was assigned to Category 3 based on area-wide empirical trends that demonstrate recovery (no co-located data).
Area 34	3.0 W	1/2	3 (VM)	Although the net sedimentation rate is below 1 cm/yr, Area 34 is not subject to scour and has relatively low surface sediment concentrations. However, there are no empirical trend data in Area 34.

Table D-2 Empirical Overrides of Recovery Category Assignments within AOPC 1 Footprint

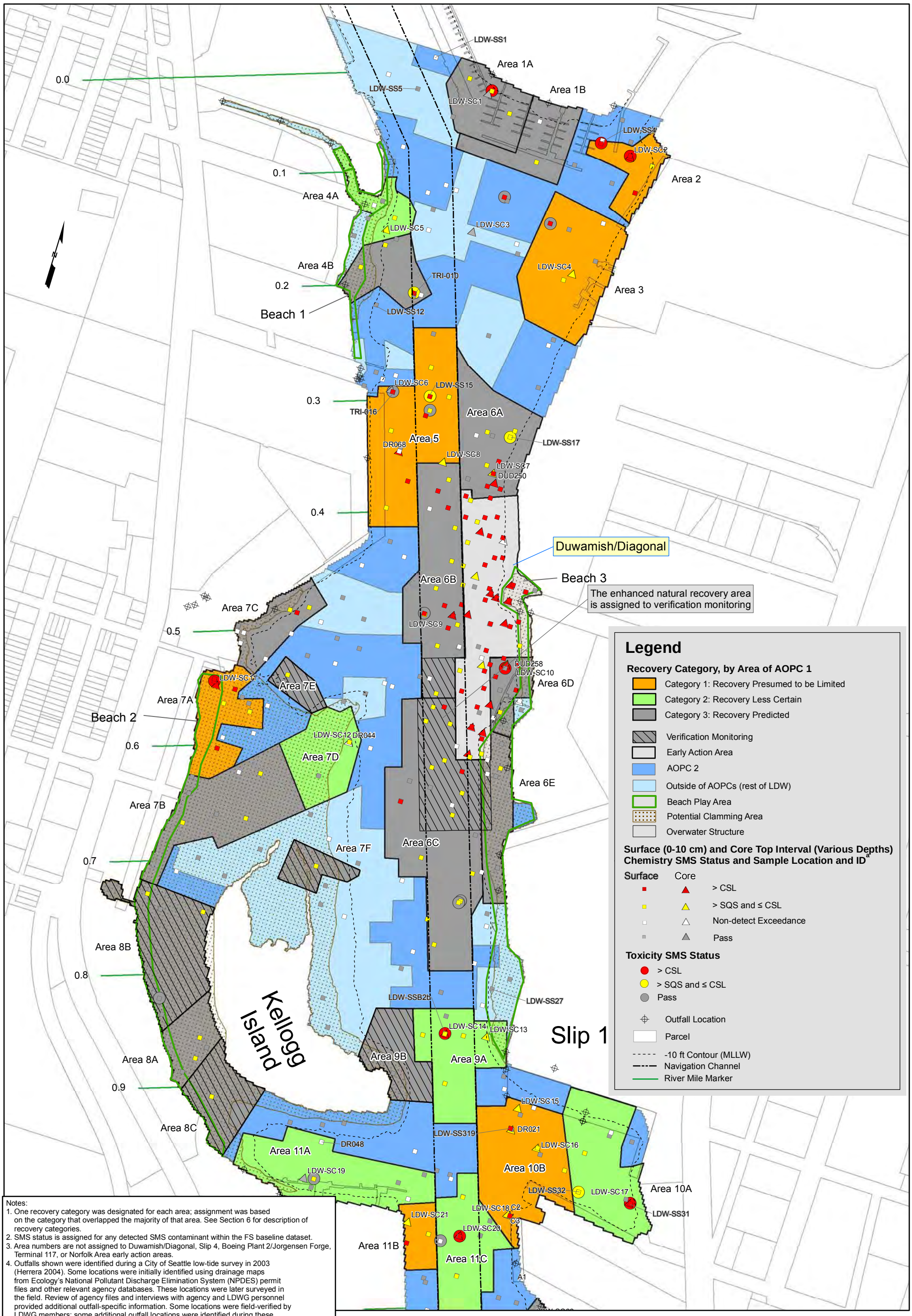
Area	River Mile	Recovery Category[a] Based on Physical Considerations	Recovery Category Conclusion Based on Empirical Data	
			Final Recovery Category (1, 2, or 3)	Best Professional Judgment Category Override Notes
Area 39	3.75 - 3.8 W	1	3 (VM)	Only small portions of this area (in the navigation channel) have high-flow scour deeper than 10 cm. This area is assigned to VM because of one isolated, old (1998) SQS exceedance.
Area 40	3.9 - 3.95 W	1	3 (VM)	This area has evidence of vessel scour outside of a berthing area, but the other physical parameters support assignment to Category 3. Additionally, the area was delineated to encompass one, isolated SQS exceedance.
Area 41A	3.7 - 4.0 E	1	2	High-flow scour is predicted near the navigation channel. This area was assigned to Category 2 because scour was not observed for most of the area and because the empirical data demonstrate mixed results.[b]

Notes:

a. Recovery categories are defined as follows: 1 - recovery is presumed to be limited; 2 - recovery is less certain; 3 - recovery is predicted.

b. Category designation outcome was determined from April 12 and 19, 2011 FS comment resolution meetings with U.S. Environmental Protection Agency (EPA)/Washington State Department of Ecology (Ecology).

AOPC = area of potential concern; cm/yr = centimeters per year; E = east; EPA = Environmental Protection Agency; FS = feasibility study; PCB = polychlorinated biphenyl; SQS = sediment quality standard; STM = sediment transport model; VM = verification monitoring; W = west.



Legend

Recovery Category, by Area of AOPC 1

- Category 1: Recovery Presumed to be Limited
- Category 2: Recovery Less Certain
- Category 3: Recovery Predicted

- Verification Monitoring
- Early Action Area
- AOPC 2
- Outside of AOPCs (rest of LDW)
- Beach Play Area
- Potential Clamming Area
- Overwater Structure

Surface (0-10 cm) and Core Top Interval (Various Depths) Chemistry SMS Status and Sample Location and ID[a]

Surface	Core	
■	▲	> CSL
■	△	> SQS and ≤ CSL
□	△	Non-detect Exceedance
■	▲	Pass

Toxicity SMS Status

- > CSL
- > SQS and ≤ CSL
- Pass

- Outfall Location
- Parcel
- -10 ft Contour (MLLW)
- Navigation Channel
- River Mile Marker

Notes:
1. One recovery category was designated for each area; assignment was based on the category that overlapped the majority of that area. See Section 6 for description of recovery categories.
2. SMS status is assigned for any detected SMS contaminant within the FS baseline dataset.
3. Area numbers are not assigned to Duwamish/Diagonal, Slip 4, Boeing Plant 2/Jorgensen Forge, Terminal 117, or Norfolk Area early action areas.
4. Outfalls shown were identified during a City of Seattle low-tide survey in 2003 (Herrera 2004). Some locations were initially identified using drainage maps from Ecology's National Pollutant Discharge Elimination System (NPDES) permit files and other relevant agency databases. These locations were later surveyed in the field. Review of agency files and interviews with agency and LDWG personnel provided additional outfall-specific information. Some locations were field-verified by LDWG members; some additional outfall locations were identified during these subsequent verifications.

a Surface sediment locations that were resampled are labeled with the newer station ID. See Appendix F for data. Other surface sediment locations are not labeled. All cores are labeled except for those in early action areas.

0 200 400 800 Feet

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Areas of AOPC 1 With Assigned Recovery Categories (RM 0.0 to 1.0)

DATE: 10/31/12 | DWRN:mvi/sea | Revision: 0 | **FIGURE D-1**

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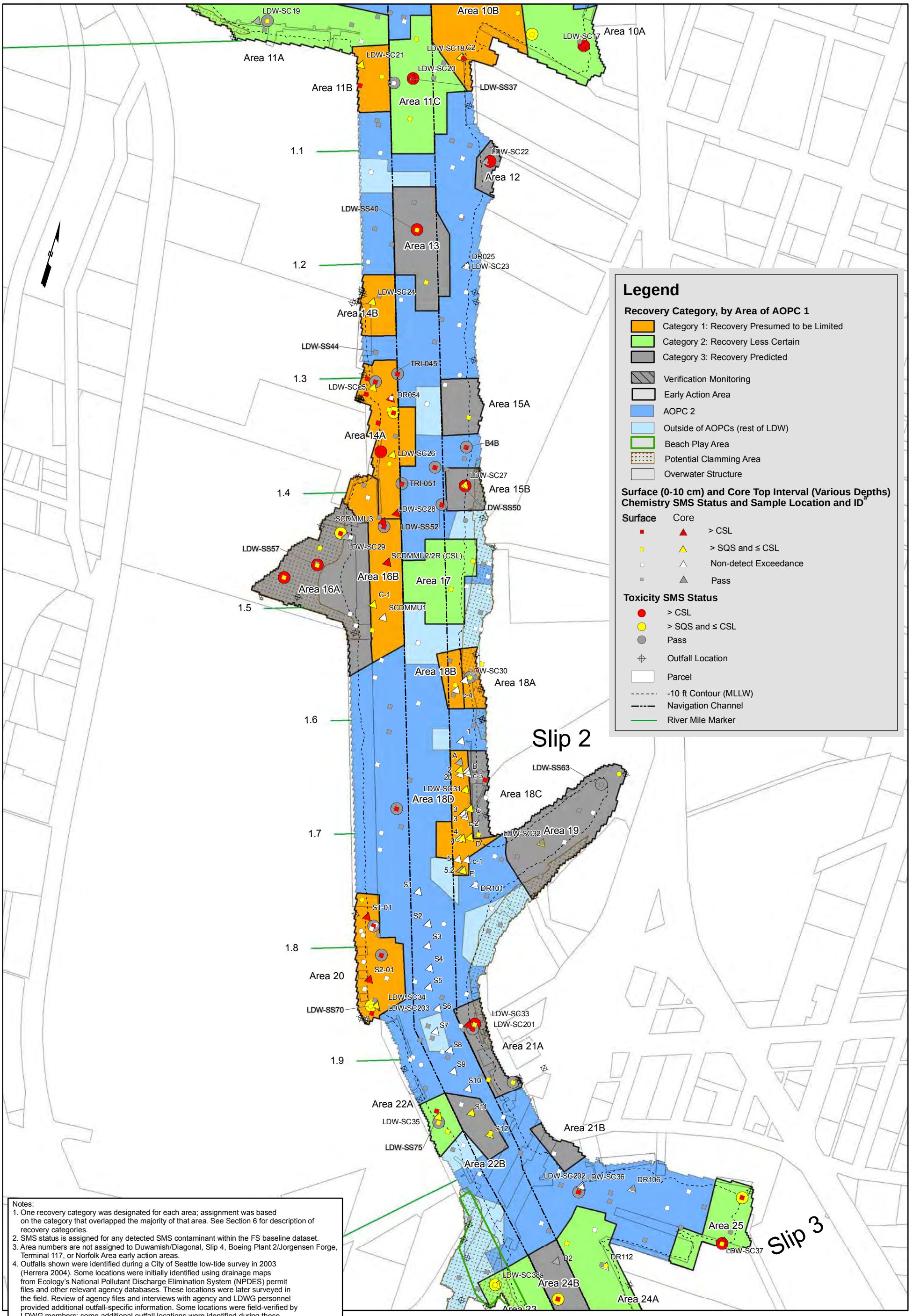

Notes:
1. One recovery category was designated for each area; assignment was based on the category that overlapped the majority of that area. See Section 6 for description of recovery categories.
2. SMS status is assigned for any detected SMS contaminant within the FS baseline dataset.
3. Area numbers are not assigned to Duwamish/Diagonal, Slip 4, Boeing Plant 2/Jorgensen Forge, Terminal 117, or Norfolk Area early action areas.
4. Outfalls shown were identified during a City of Seattle low-tide survey in 2003 (Herrera 2004). Some locations were initially identified using drainage maps from Ecology's National Pollutant Discharge Elimination System (NPDES) permit files and other relevant agency databases. These locations were later surveyed in the field. Review of agency files and interviews with agency and LDWG personnel provided additional outfall-specific information. Some locations were field-verified by LDWG members; some additional outfall locations were identified during these subsequent verifications.

a Surface sediment locations that were resampled are labeled with the newer station ID. See Appendix F for data. Other surface sediment locations are not labeled. All cores are labeled except for those in early action areas.

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Areas of AOPC 1 With Assigned Recovery Categories (RM 1.0 to 2.0)

DATE: 10/31/12	DWRN:de/sea	Revision: 0		**FIGURE D-2**

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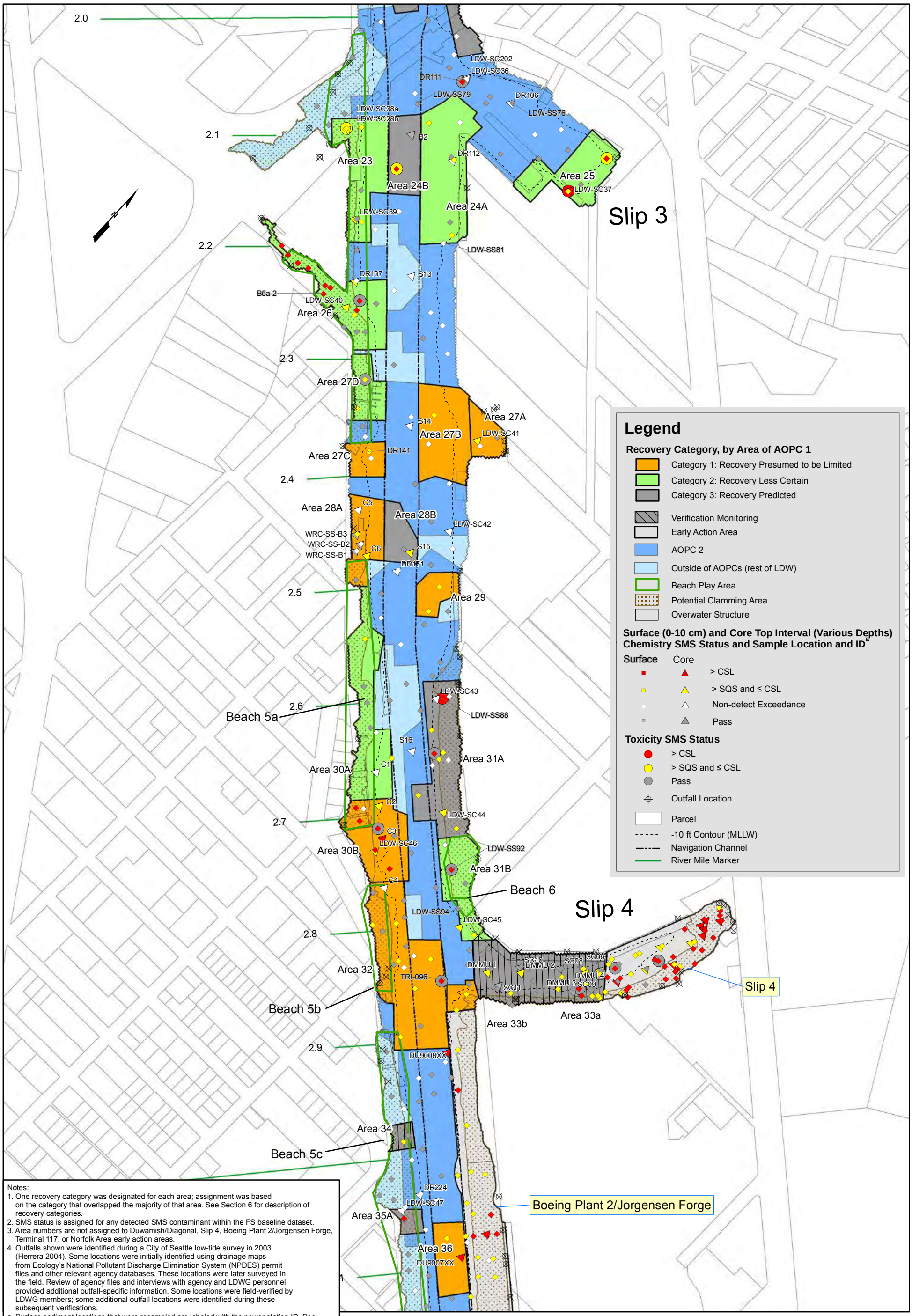

Notes:
1. One recovery category was designated for each area; assignment was based on the category that overlapped the majority of that area. See Section 6 for description of recovery categories.
2. SMS status is assigned for any detected SMS contaminant within the FS baseline dataset.
3. Area numbers are not assigned to Duwamish/Diagonal, Slip 4, Boeing Plant 2/Jorgensen Forge, Terminal 117, or Norfolk Area early action areas.
4. Outfalls shown were identified during a City of Seattle low-tide survey in 2003 (Herrera 2004). Some locations were initially identified using drainage maps from Ecology's National Pollutant Discharge Elimination System (NPDES) permit files and other relevant agency databases. These locations were later surveyed in the field. Review of agency files and interviews with agency and LDWG personnel provided additional outfall-specific information. Some locations were field-verified by LDWG members; some additional outfall locations were identified during these subsequent verifications.

a Surface sediment locations that were resampled are labeled with the newer station ID. See Appendix F for data. Other surface sediment locations are not labeled. All cores are labeled except for those in early action areas.

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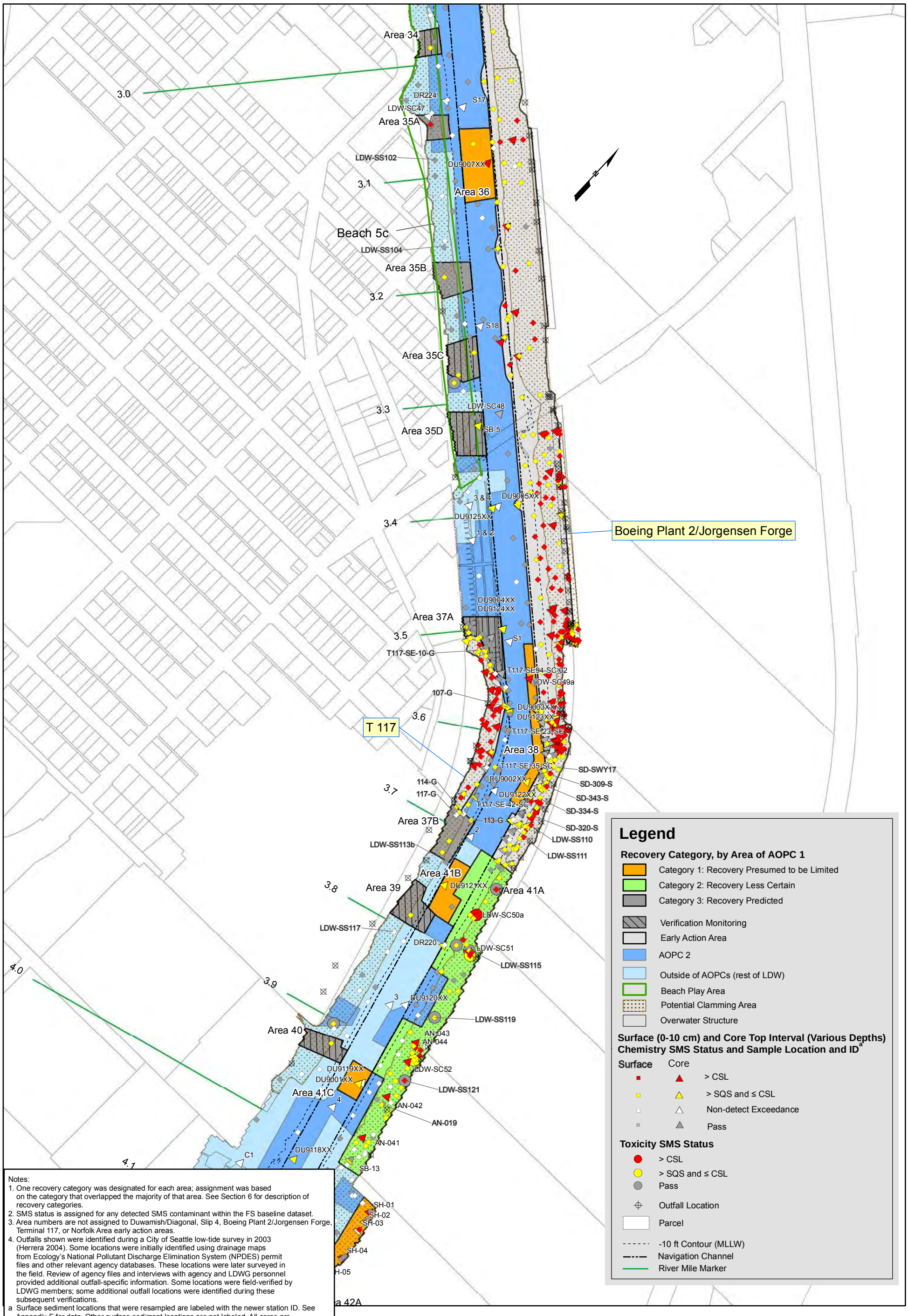
Areas of AOPC 1 With Assigned Recovery Categories (RM 2.0 to 3.0)

DATE: 10/31/12 | DWRN:de/sea | Revision: 0

FIGURE D-3

L:\Lower Duwamish FS\FS_Final_GISOct2012\FS_GIS_MXDs_Oct12\Appendix D\FigureD-3_Areas of AOPC1_Rm2_3.mxd



Notes:
1. One recovery category was designated for each area; assignment was based on the category that overlapped the majority of that area. See Section 6 for description of recovery categories.
2. SMS status is assigned for any detected SMS contaminant within the FS baseline dataset.
3. Area numbers are not assigned to Duwamish/Diagonal, Slip 4, Boeing Plant 2/Jorgensen Forge, Terminal 117, or Norfolk Area early action areas.
4. Outfalls shown were identified during a City of Seattle low-tide survey in 2003 (Herrera 2004). Some locations were initially identified using drainage maps from Ecology's National Pollutant Discharge Elimination System (NPDES) permit files and other relevant agency databases. These locations were later surveyed in the field. Review of agency files and interviews with agency and LDWG personnel provided additional outfall-specific information. Some locations were field-verified by LDWG members; some additional outfall locations were identified during these subsequent verifications.

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Legend

Recovery Category, by Area of AOPC 1
- Category 1: Recovery Presumed to be Limited
- Category 2: Recovery Less Certain
- Category 3: Recovery Predicted
- Verification Monitoring
- Early Action Area
- AOPC 2
- Outside of AOPCs (rest of LDW)
- Beach Play Area
- Potential Clamming Area
- Overwater Structure

Surface (0-10 cm) and Core Top Interval (Various Depths) Chemistry SMS Status and Sample Location and ID[a]

Surface	Core	
■	▲	> CSL
■	▲	> SQS and ≤ CSL
□	△	Non-detect Exceedance
■	▲	Pass

Toxicity SMS Status
- > CSL
- > SQS and ≤ CSL
- Pass
- Outfall Location
- Parcel
- -10 ft Contour (MLLW)
- Navigation Channel
- River Mile Marker

0 200 400 800 Feet

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Areas of AOPC 1 With Assigned Recovery Categories (RM 3.0 to 4.0)

DATE: 10/31/12 | DWRN:de/sea | Revision: 0

FIGURE D-4

L:\Lower Duwamish FS\FS_Final_GISOct2012\FS_GIS_MXDs_Oct12\Appendix D\FigureD-4_Areas of AOPC1_Rm3_4.mxd

Area 41B
DU9121XX
LDW-SC50a
Area 39
LDW-SC51
DR220
3.8
Area 41A
DU9120XX
3
AN-043
AN-044
LDW-SC52
3.9
Area 40
AN-042
DU9119XX
DU9001XX
Area 41C
4
AN-041
4.0
SB-13
DU9118XX
SH-01
SH-02
SH-03
C1
D12
5
LDW-SS125
C2
D11_08
D11_09
SH-04
4.1
C3
DU9116XX
D14
SB-12
C4
D10
ST23
SH-05
ST28
LDW-SS126
D09_08
D09_09
ST22
Area 42A
DU9115XX
Slip 6
C5
DR284
D08
ST21
SH-06
LDW-SS127
C6
SB-11
SH-07
ST31
D07
SH-09
Area 42B
DMMU 1
SH-08
SB-6
SB-5
SB-4
SB-3
SB-1
4.2
DMMU 3
D06_09
B8b
SB-8
SB-7
SB-17
SB-1
6
D06_08
DR246
LDW-SC53
LDW-SS129
D05
D15
SB-2
D13
DMMU 4
D04_09
D04_08
6
LDW-SS130
7
D03_08
D03_09
LDW-SC54
5
Area 43
4.3
DU9110XX
4
B10b
DU9109XX
Area 44
Beach 7
DTB-01SD
4.4
D02_09
D02_08
Average Of 8-9
4.5
DU9105MC
Upper Turning Basin
Area 45
C1
C1/1
4.6
Area 50
D01
Average Of 10-12
DR269
DU9101MC
Beach 8
Area 47
Upstream end of STM domain and bathymetry data. Recovery categories not assigned upstream of here.
LDW-SC55
Area 48
Norfolk Area
Area 46
LDW-SC56
LDW-SS148
NFK207
4.7
4.8
4.9
Area 49

Legend

Recovery Category, by Area of AOPC 1
- Category 1: Recovery Presumed to be Limited
- Category 2: Recovery Less Certain
- Category 3: Recovery Predicted

- Verification Monitoring
- Early Action Area
- AOPC 2
- Outside of AOPCs (rest of LDW)
- Beach Play Area
- Potential Clamming Area
- Overwater Structure

Surface (0-10 cm) and Core Top Interval (Various Depths) Chemistry SMS Status and Sample Location and ID[a]

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Toxicity SMS Status
- > CSL
- > SQS and ≤ CSL
- Pass
- Outfall Location
- Parcel
- -10 ft Contour (MLLW)
- Navigation Channel
- River Mile Marker

Notes:
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0 200 400 800 Feet

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Areas of AOPC 1 With Assigned Recovery Categories (RM 4.0 to 5.0)

DATE: 10/31/12	DWRN:de/sea	Revision: 0	FIGURE D-5

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